IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Atty. Docket
JEROEN A.L.J. RAAYMAKERS	PHNL 020233
Serial No.: 10/509,453	Group Art Unit: 2627
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METHOD AND DEVICE FOR PERFORMING TILT CORRECTION USING MULTI-DIMENSIONAL ACTUATOR

Commissioner for Patents
P.O. Box 1450
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Sir:

APPEAL BRIEF

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(i) Real Party in Interest

The real party in interest in this application is KONINKLIJKE PHILIPS ELECTRONICS N.V. by virtue of an assignment from the inventors recorded on October 20, 2005, at Reel 017111, Frames 0336.

(ii) Related Appeals and Interferences

There are no other appeals and/or interferences related to this application.

(iii) Status of Claims

Claims 1-6, 8-12, 14-16, 18 and 19 stand finally rejected by the Examiner; claim 13 has been cancelled; claim 7 has been allowed; and claim 17 has been deemed allowable over the prior art of record. Appellant hereby appeals the rejection of claims 1-6, 8-12, 14-16, 18 and 19.

(iv) Status of Amendments

There was one Response filed on July 16, 2007, after final rejection of the claims on June 15, 2007, this Response having been considered but not entered by the Examiner.

(v) <u>Summary Of Claimed Subject Matter</u>

The present invention relates to a tilt control device and method for correcting tilt of a recording surface of an optical disc. Principally, an optical disc should be kept in a flat disc shape when it is set on a disc motor, so that an optical pickup unit can keep its optical axis perpendicular to the recording surface of the disc during recording and reproducing operations. For scanning the recording tracks, the optical pickup unit moves in a radial direction in alignment with the radius of the optical disc.

In particular, the subject invention relates to a tilt control device for controlling a radial tilt of a recording surface of an optical disc with respect to an optical recording/reproducing beam. As claimed in claim 1, the tilt control device comprises "control means for generating two focus controlling outputs". This is shown in Figs. 1 and 3, and described in the Substitute Specification on page 7, lines 14-21 and page 9, line 19 to page 11, line 3, in which control means, including controller 10, registers Rf and Rβ, digital-to-analog converters Gda1 and Gda2, and dedicated power end stages GE1 and GE2, form focus control voltages Uf1 and Uf2.

In addition, the subject invention, as claimed in claim 1, includes "actuating means for receiving said two focus controlling outputs for controlling a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus controlling outputs". This is shown in Figs. 1-3, and described in the Substitute Specification on page 8, line 24 to

page 11, line 3, in which a 3D actuator 11 includes split focus coils C1 and C2 for controlling focus and tilt, the focus control voltages Uf1 and Uf2 being applied to the split focus coils C1 and C2, respectively.

Further, the subject invention, as claimed in claim 1, includes "said control means determines a radial tilt value based on a differentiation of focus control values obtained at different radii of said optical disk". This is shown in Fig. 4, and described in the Substitute Specification on page 11, lines 12-24 and page 14, line 23 to page 15, line 14, wherein mean focus values are obtained at a plurality of different radii (R1-R3), and equation 2 (shown on page 11) is used to determine the mean radial disc tilt.

As claimed in claim 4, the subject invention includes "said control means positions a sledge at at least two different radial positions, controls said actuating means to adjust the focus, and measures said focus control values at said at least two different radial positions". This is shown in Figs. 1 and 4, and described in the Substitute Specification on page 7, lines 10-19, and page 14, line 23 to page 15, line 4, the optical head 2, along with the 3D actuator 11, is mounted on a sledge (or movable carriage) 4 which is controlled by controller 10 to move in the radial direction of the optical disc 1 to a plurality of different radii.

The subject invention, as claimed in claim 10, further relates to a tilt control method for controlling a radial tilt of a recording surface of an optical disc with respect to an optical

recording/reproducing beam. In particular, as claimed in claim 10, the method includes "generating a focus controlling output and a tilt controlling output". This is shown in Figs. 1 and 3, and described in the Substitute Specification on page 7, lines 14-21 and page 9, line 19 to page 11, line 3, in which control means, including controller 10, registers Rf and Rβ, digital-to-analog converters Gda1 and Gda2, and dedicated power end stages GE1 and GE2, form focus control voltages Uf1 and Uf2.

In addition, the method of the subject invention, as claimed in claim 10, further includes "receiving said focus and tilt controlling outputs at an actuator to control a focusing state of the optical recording/reproducing beam and the radial tilt utilizing said received focus and tilt controlling outputs". This is shown in Figs. 1-3, and described in the Substitute Specification on page 8, line 24 to page 11, line 3, in which a 3D actuator 11 includes split focus coils C1 and C2 for controlling focus and tilt, the focus control voltages Uf1 and Uf2 being applied to the split focus coils C1 and C2, respectively.

Further, the method of the subject invention, as claimed in claim 10, includes "determining a radial tilt value based on a differentiation of focus control values obtained at different radii of said optical disk". This is shown in Fig. 4, and described in the Substitute Specification on page 11, lines 12-24 and page 14, line 23 to page 15, line 14, wherein mean focus values are obtained

at a plurality of different radii (R1-R3), and equation 2 (shown on page 11) is used to determine the mean radial disc tilt.

In addition to the above, the subject invention relates to a tilt control device for controlling a radial tilt of a recording surface of an optical disc with respect to an optical recording/reproducing beam. In particular, as claimed in claim 14, the tilt control device includes "a processor configured to generate two focus control outputs". This is shown in Figs. 1 and 3, and described in the Substitute Specification on page 7, lines 14-21 and page 9, line 19 to page 11, line 3, in which control means, including controller 10, registers Rf and Rβ, digital-to-analog converters Gda1 and Gda2, and dedicated power end stages GE1 and GE2, form focus control voltages Uf1 and Uf2.

Furthermore, the tilt control of the subject invention, as claimed in claim 14, includes "an actuator configured to receive said two focus control outputs; and control a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus control outputs". This is shown in Figs. 1-3, and described in the Substitute Specification on page 8, line 24 to page 11, line 3, in which a 3D actuator 11 includes split focus coils C1 and C2 for controlling focus and tilt, the focus control voltages Uf1 and Uf2 being applied to the split focus coils C1 and C2, respectively.

Finally, the tilt control device of the subject invention includes "said processor determines a radial tilt value based on a

differentiation of focus control values obtained at different radii of said optical disk”. This is shown in Fig. 4, and described in the Substitute Specification on page 11, lines 12-24 and page 14, line 23 to page 15, line 14, wherein mean focus values are obtained at a plurality of different radii (R1-R3), and equation 2 (shown on page 11) is used to determine the mean radial disc tilt.

(vi) Grounds of Rejection to be Reviewed on Appeal

A. Whether the invention, as claimed in claims 1, 4, 6, 8-10, 12 and 14, is unpatentable, under 35 U.S.C. 103(a), over U.S. Patent 6,714,498 to Park et al., in view of U.S. Patent 5,208,848 to Kusano et al., and further in view of U.S. Patent 5,627,808 to Hajjar et al.

B. Whether the invention, as claimed in claim 3, is unpatentable, under 35 U.S.C. 103(a), over Park et al., in view of Kusano et al., and in view of Hajjar et al., and further in view of U.S. Patent 6,266,301 to Morimoto.

C. Whether the invention, as claimed in claims 2, 11 and 15, is unpatentable, under 35 U.S.C. 103(a), over Park et al., in view of Kusano et al., and in view of Hajjar et al., and further in view of U.S. Patent 6,181,670 to Nagasato.

D. Whether the invention, as claimed in claims 5 and 16, is unpatentable, under 35 U.S.C. 103(a), over Park et al., in view of Kusano et al., and in view of Hajjar et al., and further in view of U.S. Patent 5,602,566 to Motosyuku et al.

(vii) Arguments

35 U.S.C. 103(a) states:

> "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

A. Whether Claims 1, 4, 6, 8-10, 12 and 14 Are Unpatentable

The Park et al. patent discloses a method for calibrating tilt in disc player, in which the time (FET1) needed for the optical pickup unit to achieve focus when it is traveling from a low point to a high point is measured, and the time (FET2) needed for the optical pickup unit to achieve focus when it is traveling from a high point to a low point is measured. Based on the difference between these times and a standard time measurement, the disc is tilted using a tilt motor to compensate for any tilting of the disc.

The Kusano et al. patent discloses an optical disk player having tilt servo control absent tilt sensor, in which a tilt servo unit for controlling the irradiated light beam to be perpendicular to the optical axis of the information recording surface according to a disk tilt detecting signal.

The Hajjar et al. patent discloses a cross-track tilt error compensation method for optical disc drives in which a tracking offset signal (TOS) is derived as a function of the cross-track tilt between the disc and the optical head for application to a

tracking error signal (TES) for offsetting an optical servo system thereby compensating for the cross-track tilt between the disc and the optical head.

The Examiner has indicated that the signals FET1 and FET2 of Park et al. equate to the two focus controlling outputs as claimed, and that the "inherent structure that moves element 20 in the focusing direction and element 40 of figure 5, which is a "tilt motor" as explained in column 7, line 55" equate to "actuating means for receiving said two focus controlling outputs for controlling a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus controlling outputs".

Appellant submits that the Examiner is mistaken. In particular, FET1 and FET2 are not "focus controlling outputs" in terms of the present patent application. FET1 and FET2 are merely calibration measurements of an ascending and descending focus error output time (e.g., see, FIG. 1 and 3, respectively steps S20 and S220, and the accompanying description contained in Col. 3, lines 4-11, and Col. 5, lines 9-25). In operation, FET2 is subtracted from FET1 (e.g., see, respectively, steps S30 and S230, and the accompanying description contained in Col. 3, lines 11-17, and Col. 5, lines 26-30), and the difference is compared to a reference focus error output difference FETrf (e.g., see, respectively, steps S40 and S240, and the accompanying description contained in Col. 3, lines 17-22, and Col. 5, lines 30-36) to determine a signal MD. The signal MD is output to a motor 40 to adjust a tilt of the turntable

(e.g., see, FIG. 5, motor driving signal generator 30, signal MD, and motor 40, respectively, steps S50 and S250, and the accompanying description contained in Col. 3, lines 27-45, and Col. 5, lines 36-43). As is made clear in Park et al., step 250 is a "tilt calibration step S50" (see, Col. 3, line 30) and step S250 is a "tilt calibration step S250 (see, Col. 5, line 13). As should be clear from the above, FET1 and FET2 are merely utilized to determine a focus error output difference that is compared to FETrf. Accordingly, it is not supported by Park that FET1 and FET2 are "focus controlling outputs" in terms of the claims presented in the present application.

In response thereto, the Examiner merely states "As signals FET1 and FET2 are outputs being used to control the focusing, they are focus controlling outputs."

Appellant has read Park et al. in its entirety and nowhere is there any mention or suggestion that FET1 and FET2 are being used to control focusing. Rather, FET1 and FET2 are time measurements denoting when focus is achieved when the optical pickup unit 20 "is made to ascend and then descend for a predetermined time" (col. 3, lines 3-12). While Park et al. may call FET1 and FET2 first and second focus error output times, these signals are in no way used to control focus, their only purpose being to control the tilt motor. This is in contrast to the subject invention where it is claimed "actuating means for receiving said two focus controlling outputs for controlling a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two

focus controlling outputs". This is supported in the Substitute Specification on page 10, line 1 to page 11, line 6 (paragraph [0028]) where focus control voltages Uf1 and Uf2 are generated and applied to coils C1 and C2 of a 3D actuator, which, in turn, control both focus (along the z axis in Fig. 2) and tilt (• in Fig. 2) of the optical beam with respect to the surface of the optical disc 1.

While Kusano et al. discloses tilting the optical beam as opposed to the optical disc in Park et al., Appellant submits that Kusano et al. does not supply that which is missing from Park et al., i.e., "control means for generating two focus controlling outputs" and "actuating means for receiving said two focus controlling outputs for controlling a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus controlling outputs".

Similarly, while Hajjar et al. discloses determining a radial tilt value based on a differentiation of focus control values obtained at different radii of an optical disk, Appellant submits that Hajjar et al. does not supply that which is missing from Park et al. and Kusano et al., i.e., "control means for generating two focus controlling outputs" and "actuating means for receiving said two focus controlling outputs for controlling a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus controlling outputs". It should be noted that Hajjar et al. does not teach correcting the tilt of the

optical beam with respect to the optical disc. Rather, Hajjar et al. teaches compensating for any tilt.

B. Whether Claim 3 Is Unpatentable

The above arguments with regard to Park et al., Kusano et al. and Hajjar et al. are incorporated herein.

The Morimoto patent discloses an optical storage device and optical head having TES compensation sift signal compensation, in which a PID (Proportional Integral and Differential) control converts a focus error signal to a focus drive signal.

However, Appellant submits that Morimoto does not supply that which is missing from Park et al., Kusano et al. and Hajjar et al., i.e., "control means for generating two focus controlling outputs" and "actuating means for receiving said two focus controlling outputs for controlling a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus controlling outputs".

C. Whether Claims 2, 11 and 15 Are Unpatentable

The above arguments with regard to Park et al., Kusano et al. and Hajjar et al. are incorporated herein.

The Nagasato patent discloses an optical lens mounting apparatus and objective lens driving apparatus, which includes an electromagnetic actuator for moving the objective lens for translation in the focusing direction and tracking direction, and

for turning in the tangential tilt direction and in the radial tilt direction.

The Examiner indicates that "Nagasato teaches in figure 7 the device wherein said actuating means or actuator comprises a split focus coil arrangement for providing focus and tilt adjustment (done by elements 112 and 114), and said control means or processor supplies said two focus controlling outputs (currents sent to drive each coil) to respective coils of said split focus coil arrangement."

Appellant submits that the Examiner is mistaken. In particular, Nagasato does not show or suggest a split focus coil arrangement. Rather, Nagasato discloses two driving coil assemblies 112 and 114 arranged on opposite sides of the objective lens. As stated in Nagasato at col. 8, line 59 to col. 9, line 3:

> "Each of the driving coil assemblies 112 and 114 has a focusing coil, a tracking coil, a radial tilt coil and a tangential tilt coil. The driving coil assemblies 112 and 114 consisting of the plurality of coils, and the electromagnetic 116 and 118 constitute the plurality of component magnetic circuits of the magnetic actuator.
>
> "Driving currents are supplied to the coils of the driving coil assemblies 112 and 114 by a power source, not shown. The driving currents are controlled on the basis of control signals to control driving operations to drive a movable unit 30 including the objective lens 1 for movement relative to the support block 6."

From the above, it appears that each of the coil assemblies 112 and 114 have a plurality of independent coils, each receiving its own driving current. Further, since the power supply and the particular driving currents are not shown or disclosed in Nagasato, one can only presume that separate driving currents are provided to

each of the coils of each of the coil assemblies. Hence, as opposed to the two focus controlling outputs being supplied to the coils of the split focus coil arrangement as claimed in claim 2, Nagasato discloses at least 8 different driving currents being supplied to the 8 separate coils in the coil assemblies 112 and 114.

D. <u>Whether Claims 5 and 16 Are Unpatentable</u>

The above arguments with regard to Park et al., Kusano et al. and Hajjar et al. are incorporated herein.

The Motosyuku patent discloses a small-sized information processor capable of scrolling screen in accordance with tilt, and scrolling method therefor, in which, as indicated in the Abstract:

> "A small-sized information processor which is used while being held in one hand, and which can scroll a display screen in accordance with a tilt. When a scroll start switch is depressed, the tilt angle of a display unit at this time is detected as an initial tilt angle by a tilt sensor. When a predetermined time period has lapsed since the depression of the switch, the tilt angle of the display unit is detected as a second tilt angle by the tilt sensor. The initial tilt angle is subtracted from the second tilt angle by a processing unit, thereby calculating the relative tilt angle of the display unit. The processing unit scrolls the display screen of the display unit on the basis of the calculated relative tilt angle. The scrolling speed of the display unit may well be changed in accordance with the width of the relative tilt angle."

Firstly, Appellant would like to note that Motosyuku et al. is not analogous art, in that Motosyuku et al. is not concerned about correcting or compensating for tilt, but rather, controls scrolling of an image on display based on the difference in tilt from an initial position.

Further, according to the Examiner:

"Motosyuku et al teaches a device wherein said control means such as a processor calculates (based on FET1 and FET2) is arranged to set a mean disc tilt value in a tilt register (column 7, lines 32-50). The device taught records the tilt angle value of a processor into a register. This is similar to recording the tilt value of a disc as both inventions relate to fixing errors caused by tilt, although they are for two different devices."

Appellant submits that by merely reading this section of Motosyuku et al., it should be apparent that there is no mean tilt value determined or stored in Motosyuku et al. Rather, an actual tilt value is stored in a register. Further, Applicant submits that the Examiner's understanding of Motosyuku et al. is flawed, in that Motosyuku et al. is not concerned with "fixing errors caused by tilt", but rather, is using the tilting of a handheld device in order to control scrolling of the content being displayed on a display screen of the handheld device.

Hence, Appellant submits that Motosyuku et al. neither shows nor suggests "said control means calculates a mean disc tilt value in a tilt register".

Based on the above arguments, Appellant believes that the subject invention is not rendered obvious by the prior art and is patentable thereover. Therefore, Appellant respectfully requests that this Board reverse the decisions of the Examiner and allow this application to pass on to issue.

Respectfully submitted,

by ___/Edward W. Goodman/___________

Edward W. Goodman, Reg. 28,613

Attorney

(viii) Claims Appendix

1. (Previously Presented) A tilt control device for controlling a radial tilt of a recording surface of an optical disc with respect to an optical recording/reproducing beam, said tilt control device comprising:

control means for generating two focus controlling outputs; and

actuating means for receiving said two focus controlling outputs for controlling a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus controlling outputs, wherein said control means determines a radial tilt value based on a differentiation of focus control values obtained at different radii of said optical disk.

2. (Previously Presented) The device as claimed in claim 1, wherein said actuating means comprises a split focus coil arrangement for providing focus and tilt adjustment, and said control means supplies said two focus controlling outputs to respective coils of said split focus coil arrangement.

3. (Previously Presented) The device as claimed in claim 1, wherein said focus controlling outputs are Proportional Integral Derivative (PID) controller outputs.

4. (Previously Presented) The device as claimed in claim 1, wherein said control means positions a sledge at at least two different radial positions, controls said actuating means to adjust the focus, and measures said focus control values at said at least two different radial positions.

5. (Previously Presented) The device as claimed in claim 1, wherein said control means calculates a mean disc tilt value in a tilt register.

6. (Previously Presented) The device as claimed in claim 1, wherein said control means generates said focus controlling outputs based on measured mean focus control values and corresponding radial steps between two measurements.

7. (Previously Presented) A tilt control device for controlling a radial tilt of a recording surface of an optical disc with respect to an optical recording/reproducing beam, said tilt control device comprising:

control means for generating two focus controlling outputs; and

actuating means for controlling a focusing state and the radial tilt of the optical recording/reproducing beam based on said two focus controlling outputs, characterized in thatwherein said control means determines a radial tilt value based on a differentiation of focus control values obtained at different radii

of said optical disk, wherein said mean disc tilt value is obtained based on the following equation:

$$r_\beta = \frac{G_c c_t \Delta r_f}{c_f (a_1 + a_2) \Delta R}$$

where •r_f is the difference between two averaged focus control values measured at initialization, •R is a sledge step in radial direction between two measurements, G_C is the factor between actuator tilt and disc tilt for which comatic aberrations are optimal corrected, c_f is a spring constant acting against a focusing movement, c_t is a spring constant acting against a tilt movement, a_1 is a distance of a first coil of said split coil arrangement with respect to a symmetry line, and a_2 is a distance of a second coil of said split coil arrangement with respect to said symmetry line.

8. (Previously Presented) The device as claimed in claim 1, wherein said device further comprises a tilt table for storing an information indicating mean disc tilt values and corresponding radial positions.

9. (Previously Presented) An optical disc player comprising a tilt control device as claimed in claim 1.

10. (Previously Presented) A tilt control method for controlling a radial tilt of a recording surface of an optical disc with respect

to an optical recording/reproducing beam, said tilt control method comprising the steps acts of:

generating a focus controlling output and a tilt controlling output; and

receiving said focus and tilt controlling outputs at an actuator to control a focusing state of the optical recording/reproducing beam and the radial tilt utilizing said received focus and tilt controlling outputs; and

determining a radial tilt value based on a differentiation of focus control values obtained at different radii of said optical disk.

11. (Previously Presented) The method as claimed in claim 10, wherein said receiving said focus and tilt controlling outputs act comprises using a split coil arrangement arranged to provide a focus adjustment, said focus and tilt controlling outputs being supplied to respective coils of said split coil arrangement.

12. (Previously Presented) The method as claimed in claim 10, wherein said receiving said focus and tilt controlling outputs act comprises using a mean focus controlling output for tilt control.

13. (Cancelled).

14. (Previously Presented) A tilt control device for controlling a radial tilt of a recording surface of an optical disc with respect

to an optical recording/reproducing beam, said tilt control device comprising:

a processor configured to generate two focus control outputs; and

an actuator configured to:

receive said two focus control outputs; and

control a focusing state and the radial tilt of the optical recording/reproducing beam utilizing said received two focus control outputs, wherein said processor determines a radial tilt value based on a differentiation of focus control values obtained at different radii of said optical disk.

15. (Previously Presented) The device as claimed in claim 14, wherein said actuator comprises a split focus coil arrangement for providing focus and tilt adjustment, and said processor supplies said two focus control outputs to respective coils of said split focus coil arrangement.

16. (Previously Presented) The device as claimed in claim 14, wherein said processor calculates a mean disc tilt value in a tilt register.

17. (Previously Presented) The device as claimed in claim 16, wherein said mean disc tilt value is obtained based on the following equation:

$$r_\beta = \frac{G_c c_t \Delta r_f}{c_f (a_1 + a_2) \Delta R}$$

where •r_f is the difference between two averaged focus control values measured at initialization, •R is a sledge step in radial direction between two measurements, G_C is the factor between actuator tilt and disc tilt for which comatic aberrations are optimal corrected, c_f is a spring constant acting against a focusing movement, c_t is a spring constant acting against a tilt movement, a_1 is a distance of a first coil of said split coil arrangement with respect to a symmetry line, and a_2 is a distance of a second coil of said split coil arrangement with respect to said symmetry line.

18. (Previously Presented) The device as claimed in claim 14, wherein said device further comprises a tilt table for storing an information indicating mean disc tilt values and corresponding radial positions.

19. (Previously Presented) The device as claimed in claim 14, wherein said processor generates said focus control outputs based on measured mean focus control values and corresponding radial steps between two measurements.

(ix) Evidence Appendix

There is no evidence which had been submitted under 37 C.F.R. 1.130, 1.131 or 1.132, or any other evidence entered by the Examiner and relied upon by Appellant in this Appeal.

(x) Related Proceedings Appendix

Since there were no proceedings identified in section (ii) herein, there are no decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 C.F.R. 41.37.